Bioinformatics Specialists

What They Do

Bioinformatics has transformed the discipline of biology from a purely lab-based science to an information science as well. —National Center for Biotechnology Information

Biological processes are so complex that researchers are only now beginning to tease out the details of the human and animal genetic codes. The collection and management of data is instrumental to deciphering these complexities. It is at this interface of research and data management that the Bioinformatics Specialists work. Job titles used include bioinformaticist, bioinformatics analyst, bioinformatics scientist, and bioinformation programmer.

These computational biology specialists are well versed in both the life sciences and data processing. Modern biotech research and manufacturing could not exist without powerful computing capabilities and equipment. Bioinformatics Specialists may work on such data as DNA and protein sequence, microarray, and biological pathways analysis.

Some of the techniques they use include data mining, analysis, presentation, and storage of biological data. Not only did the information have to be stored, it had to be organized and disseminated to other scientists around the world. Formerly, life scientists worked within small discrete communities studying isolated biological problems. As the knowledge base of science grows at an ever-accelerating rate, the challenge of managing the research data creates both promise and problem. The exchange of seemingly unrelated pieces of information has given scientists in disparate areas of research insight into problems that would otherwise go unsolved. A well-known example is the polymerase chain reaction (PCR) technique for amplifying small amounts of DNA in a sample. The PCR analysis uses an enzyme from a bacteria that lives in the near-boiling waters of Yellowstone's geoactive regions. This technique gives forensic scientists a remarkable tool to help identify criminals from minuscule bits of DNA left at a crime scene.

Information in the public domain must be disseminated. For example, the National Institute of Health responds to about three million requests per day for life science information. Bioinformatics Specialists design and apply computer systems and databases to organize, analyze, and mine biological data. They work with a team of software engineers and biologists to develop and maintain a biologic database. They may create code and documentation and provide support to users. They troubleshoot operational errors and decide what action is needed. They collect, assemble, and curate emerging data. They collaborate with laboratory scientists to define and design informatics projects of value to the pharmaceutical and health care industry.

Bioinformatics Specialists must be able to work independently and as part of a team to apply their knowledge of clinical trials, sequence analysis, microarrays, and laboratory information management systems.

*Bioinformatic Specialists in the biotech industry share characteristics of Database Administrators and Applications Computer Software Engineers. Detailed descriptions of these occupations may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.*

Important skills, knowledge, and abilities include:

- Computers and Electronics – Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

EDD Employment Development Department State of California

LMID Labor Market Information Division "Your Information Source"

Bioinformatics Specialists

- Operations Analysis – Analyzing needs and product requirements to create a design.
- Science – Using scientific rules and methods to solve problems.
- Programming – Writing computer programs for various purposes.
- Written Comprehension – The ability to read and understand information and ideas presented in writing.
- Oral Expression – The ability to communicate information and ideas in speaking so others will understand.

Training/Requirements

- Master of Science or Ph.D. in bioinformatics, computer engineering, computational biology, or related field. Ph.D. in genetics or genomics required for some positions.
- Must have strong background in both computational and life science.
- Biological laboratory experience.
- Up to two years of related experience and knowledge of a company's products is desirable.

What's the California Job Outlook?

While the Bureau of Labor Statistics does not collect data on Bioinformatics Specialists, the occupations listed below are found in the biotechnology industry and have similar duties. The California outlook and wage figures are drawn from all industries and represent occupations comparable to Bioinformatics Specialists.

Standard Occupational Classification	Estimated Number of Workers 2002	Estimated Number of Workers 2012	Average Annual Openings	2005 Wage Range (per hour)
Computer Software Engineers, Applications				
15-1031	79,100	108,900	3,760	$32.25 to $50.98
Database Administrators				
15-1061	13,600	19,300	710	$23.53 to $43.80

These figures do not include self-employment.
***Average annual openings** include new jobs plus openings due to separations.*
Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Additional Sources of Information

National Center for Biotechnology Information
(301) 496-2475
www.ncbi.nlm.nih.gov

Occupational Information Network (O*NET)
http://online.onetcenter.org